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A LOW-CUTTING SLED CORN CUTTER

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Harvesting corn by hand is a slow and very laborious task, yet a large part of the corn harvested is produced on acreages per farm too small to warrant investing in a corn binder. The stubble left in a cornfield where harvesting has been done by ordinary hand methods represents an appreciable part of the growth, which cannot be utilized as efficiently as the part that is harvested. In those areas infested with the European corn borer it is especially desirable to cut fodder close to the ground surface, so that no stubble will be left to harbor the borers. The low-cutting sled corn cutter pictured in figure 1 and described in the following pages has been devised to reduce the labor of gathering the stalks for ensiling or other use, where the use of a binder is not practicable. The sled cutter costs little to make, and is easily constructed and operated. Two men operating a sled cutter should be able to cut about as much corn in a day as a one-row binder, and to obtain 1,600 to 2,000 pounds more fodder per acre than the standard binder.

HOW TO MAKE A CORN CUTTER

All materials required to construct a two-row sled-type corn cutter are listed in table 1. Much if not all of this material may be available on the farm. In some cases material which is at hand may readily be substituted for parts listed. The dimensions here given are for finished pieces. If rough lumber is used, allowances must be made for its larger dimensions. The assembly of the machine is shown in figure 2, and the names and locations of the parts are given. Details of the parts are found in figures 3 to 16. This cutter is intended for use in corn planted in 42-inch rows, and variations from this width of planting will require corresponding changes in the dimensions used in making the parts of the machine.

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TABLE 1.—*Bill of material for sled corncutter*

Pieces (number)	Material	Size of piece [1]	Used for—	Figure no.
2	Oak	3¾ by 1¾ by 72 inches	Runners	3
2	Yellow pine	3½ by 1½ by 28 inches	Front and center cross members.	4 and 5
1	do	3½ by 1½ by 47 inches	Rear cross member	6
2	do	1½ by 1½ by 63½ inches	Fillets	8
2	do	1¾ by ¾ by 23 inches	Shims	
1	do	3¼ by ¾ by 28 inches	Floor board no. 1	9
1	do	4¾ by ¾ by 42½ inches	Floor board no. 2	
2	do	4¾ by ¾ by 47 inches	Floor boards nos. 3 and 4	
2	do	11½ by ¾ by 28 inches	Flooring	
1	do	5½ by ¾ by 28 inches	do	
1	do	4¾ by ¾ by 28 inches	do	
2	do	3½ by 1½ by 41¼ inches	Colter supports	7
2	do	2 by 1½ by 6 inches	Colter blocks	10
2	do	5½ by ¾ by 16 inches	Side guards	11
2	do	¾ by ¾ by 11¼ inches	Cleats	
4	do	3½ by *c*[2] by 3½ inches	Blocks	13
2	do	3½ by 1½ by 36 inches	Standards	12
1	do	3½ by 1½ by 48 inches	Bar	14
2	Sheet iron	3 by 3 inches (20 gage)	Wear plates	
1	do	*a*[3] by 19 inches (20 gage)	Cover	
2	Knife arms	3 by ½ by 24 inches		15
1	Knife	40-inch John Deere no. 16148	Right hand	16
1	do	40-inch John Deere no. 16149	Left hand	
1	Machine bolt	5/16 by 1½ inches	Hitch loop for holding singletree.	
2	Eye bolts	5/16 by 6 inches	Standards and bar	
24	Carriage bolts	5/16 by 5½ inches	Runners, colter supports, and blocks.	
4	do	5/16 by (*a*[3]+2) inches	Standards	
2	do	½ by 2½ inches	Hitch	
2	do	½ by 3½ inches	Knife arms	
4	Round-head, square-neck plow bolts.	⅜ by 1¼ inches	Knife	
29	Flat washers	5/16-inch	All 5/16-inch bolts	
2	do	⅜-inch	Front knife bolts	
4	do	½-inch	Hitch and knife arms	
20	Common wire nails	Fourpenny	Cover and wear plates	
½-pound	do	Eightpenny	Fillet, flooring, cleats, and blocks.	
1	Colter with hub and axle.	15-inch		
6 feet	Steel chain	¼-inch	Hitch	
4	Cotter pins	⅛ by 1 inch	Knife arm and hitch bolts	

[1] Dimensions of lumber are those of finished pieces.
[2] See explanation on figure 13.
[3] According to colter used (p. 3).

A framework is first formed by constructing and assembling the runners and cross members on which other pieces can be assembled. In making the runners shown in Fig. 3, oak should be used because of its superior wearing quality. If runners are steel-shod, pine can be used instead of oak. Be sure in shaping the runners that the curve on the side of the front end is cut on the outside of each runner so that a right and left are made. The counterbores shown can easily be made either with a countersink or a large wood bit. If the latter is used the counterbored portion should, of course, be bored first so that the bit will center properly. Holes extending from the top to the bottom of the runners will center correctly in the runners if drilled halfway through from each edge so that they meet in the center of the runner.

The front, center, and rear cross members (figs. 4, 5, and 6) can be made and bolted in place immediately. The overall dimension of the colter hub and bearings determines the dimension *a* on the center and rear cross members, shown in figures 5 and 6. A 15-inch colter will fit best with the parts here shown, but a larger or smaller colter can be used. Suitable clearance must be allowed between the cover and the colter, and between the rear cross member and the colter, for whatever colter is used, and the axle must be set low enough to enable the cutting edge to penetrate into the ground sufficiently to steady the sled between the corn rows.

Dimension *a* (figs. 5 and 6) should be the overall length of colter hub and bearings when in running position plus 1½ inches. Of course, if rough lumber is used for the colter support (fig. 7), the amount to be added will vary from 1½ inches, depending on the thickness of the lumber and whether the bolts which fasten the support to the cross members are centered in the colter support. Dimensions *b* are equal, and can readily be found by halving the remainder after *a* and all given dimensions have been deducted from the overall length shown for the cross member being made. When the sled is assembled, the cross members should be squared very carefully so that they are at right angles to the runners before the nuts on the bolts holding them to the runners are pulled down tight. Failure to square these parts will result in the colter supports being thrown out of position and consequent misalignment of the colter, and will thus prevent the sled's running in the center of the space between the corn rows. The bolts should be inserted from the bottom of the runner and the head driven into the counterbores so that the square shoulders seat solidly in the wood. Flat steel washers should be used

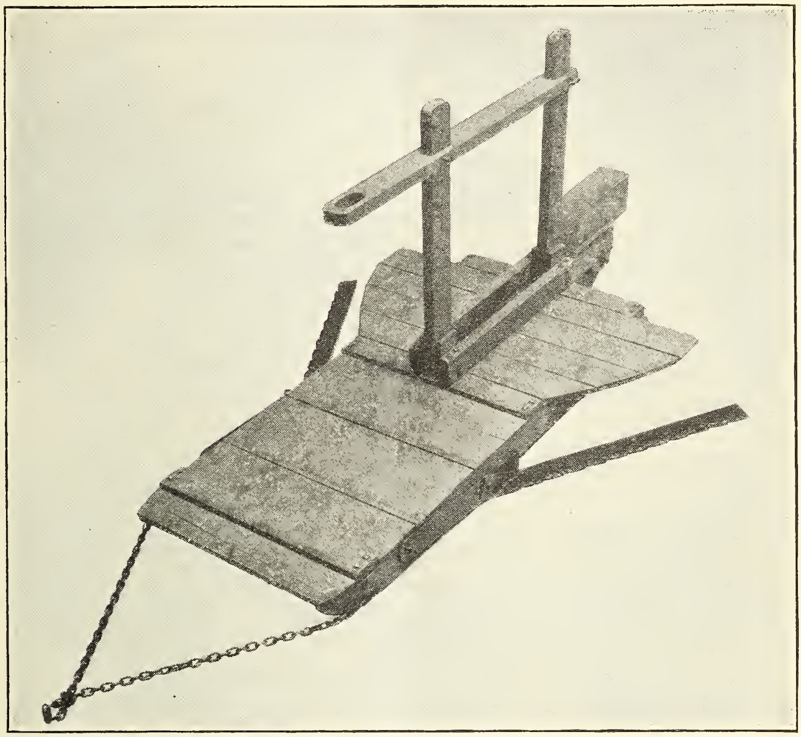


FIGURE 1.—Two-row sled corn cutter.

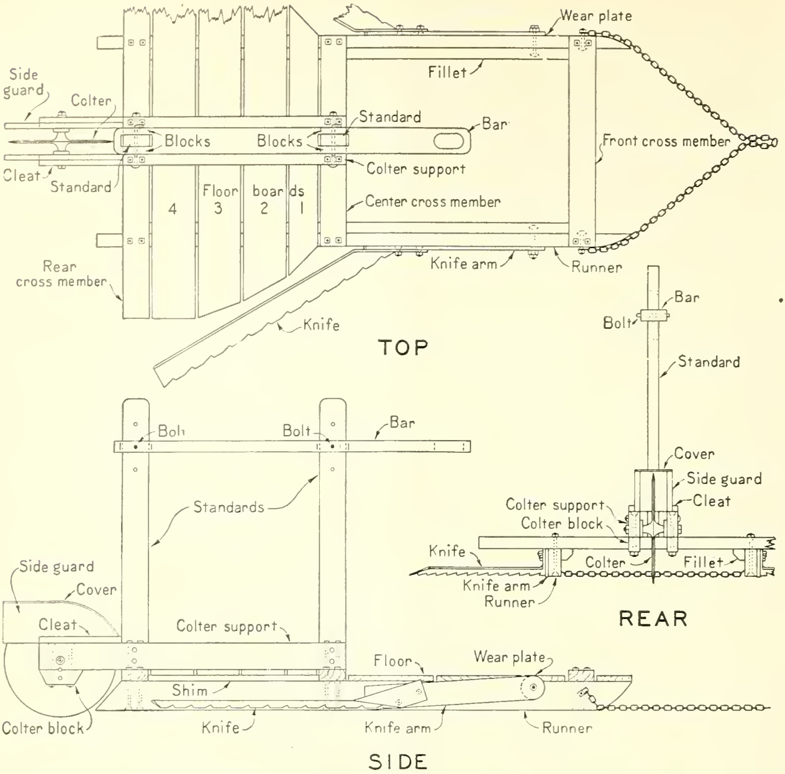


Figure 2.—Assembly (top, side, and rear views), sled corn cutter.

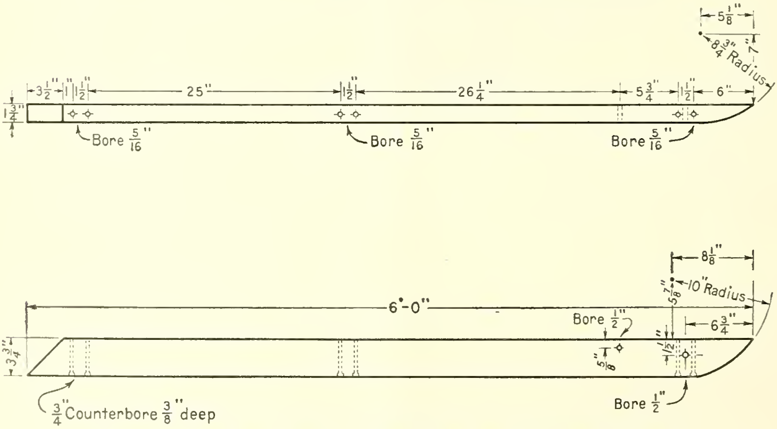


Figure 3.—Runner (make one right and one left; right shown).

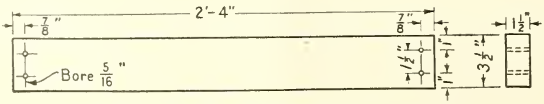
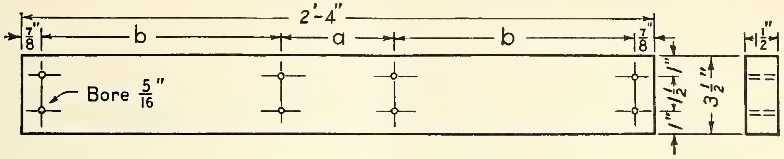


Figure 4.—Front cross member (make one).

under all nuts that would otherwise screw down against wooden parts.

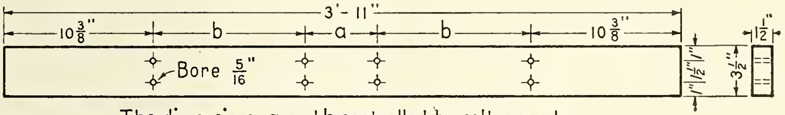
After the cross members and runners have been bolted solidly together, the sled can be turned upside down and the knife arm bolts inserted and driven into place from the inside of the runner. The fillets (fig. 8) are then nailed to the runners and cross members. In making these fillets, be sure that one is a right and one a left, by beveling opposite bottom edges.



The dimensions *a* and *b* controlled by colter used

FIGURE 5.—Center cross member (make one).

The cutter can then be turned right side up and a wooden shim (fig. 2), ¾-inch thick by 1¾ inches wide by 23 inches long, be nailed to the top of each runner between center and rear cross members.



The dimensions a and b controlled by colter used

FIGURE 6.—Rear cross member (make one).

The floor boards shown in figure 9 are to be cut next and nailed in place on top of the shims, making a floor level with the tops of the center and rear cross members. Cracks about ⅜-inch wide should be left between boards and between cross members and boards to allow dirt to work down through the floor. The remainder of the sled is floored as is shown in the assembly (fig. 2) by nailing boards directly to the runners and fillets.

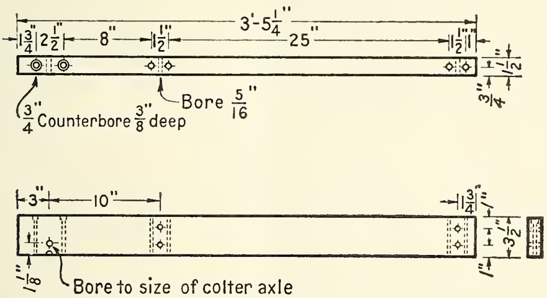


FIGURE 7.—Colter support (make two alike).

The colter supports and colter blocks shown in figures 7 and 10 are made next. The colter block should be bolted to the colter support before the holes for the colter axle are drilled. Great care should be used in locating the holes precisely the same distance from the bolts holding the cross member and colter support together, so that the colter will run exactly parallel to the sled runners. Holes extending from the top to the bottom of the colter support should be drilled from each edge to the center, as were the holes in the runners,

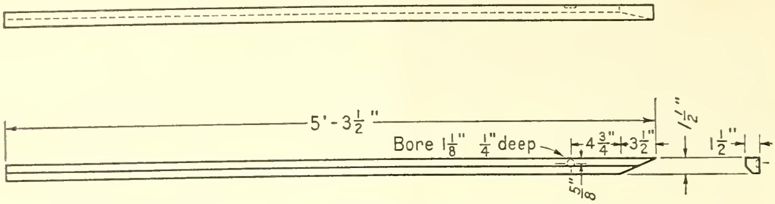


FIGURE 8.—Fillet (make one right and one left; left shown).

to insure the centering of the supports on the cross members. Bolts for the colter blocks are passed through the colter supports with heads driven into the counterbores. Bolts are inserted up through the center and rear cross members to hold the colter supports in place. Do not fail to use flat steel washers on all these bolts or to square the colter supports with the cross members.

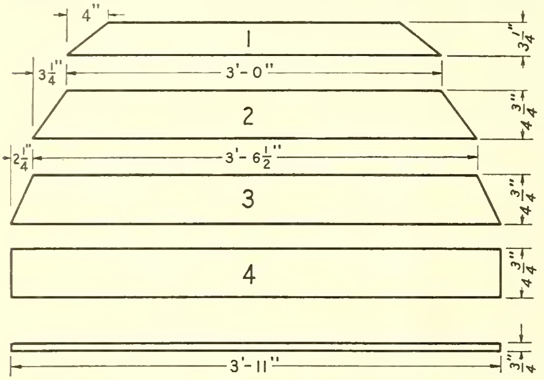


FIGURE 9.—Floor boards Nos. 1, 2, 3, and 4.

Cleats ¾ by ¾ by 11¼ inches can then be nailed to the side guards shown in figure 11 in the position indicated in figure 2 and the side guard-cleat assembly nailed to the colter support. Cut a cover 19 inches long and of width *a*, (p. 3) and nail it to the side guards with short nails. If a piece of sheet metal cannot readily be obtained, a board nailed to the top of the side guards will serve.

Next make the standards shown in figure 12 and the blocks shown in figure 13. The latter are used merely to center the standards rigidly between the colter supports and can be made of several thin boards if more convenient. Eyebolts $\frac{5}{16}$ by 6 inches, or even plain $\frac{5}{16}$-inch bolts can be used to hold the bar (fig. 14) at the most convenient height on the standards. The slot in the front end of the bar is intended to provide a place where the reins may be fastened.

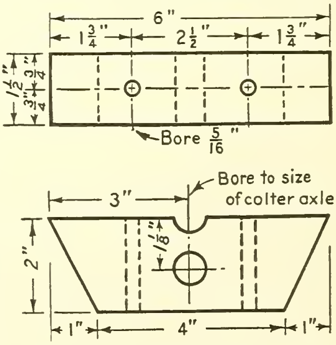


FIGURE 10.—Colter bearing block (make two alike).

The wear plates (fig. 2), consisting of circular sheet-iron disks 3 inches in diameter with $\frac{9}{16}$-inch holes in the centers, are next placed on the knife arm bolts and nailed to the runners. The colter can then be mounted with its axle in one of the sets of holes provided. It is well to fasten the nut on the axle with a cotter pin or other device, to prevent the nut from unscrewing and allowing the bearings to become loose as the colter rolls.

After the hitch bolts are driven through the runners from the inside, the chain can be attached for a hitch. It may be necessary to spread the end links slightly to get the bolts through them. If $\frac{5}{32}$-inch holes are drilled through the nuts and bolts after the chain is in place, and cotter pins inserted, the nuts will not come off in the field and allow the hitch to come loose. A loop may be formed, as shown in the hitch in the top view (fig. 2), and held by a bolt run through two links. This will prevent the singletree from slipping and will permit adjustment to offset ditches or ridges between corn rows which may cause the cutter to crowd one row too closely. A short singletree is desirable. If it is over 24 inches long, stalks which do not stand up well in the row will be knocked down before they can be reached by the men operating the cutter.

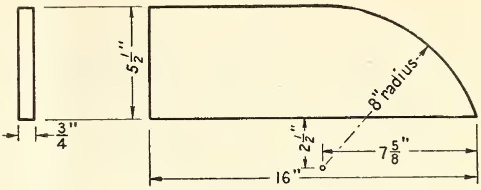
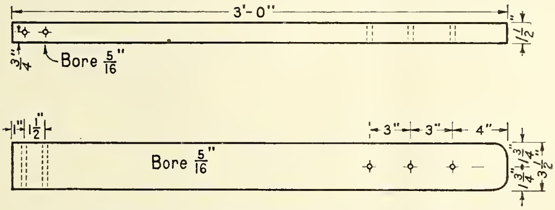


Figure 11.—Side guard (make two alike).



Firure 12.—Standard (make two alike).

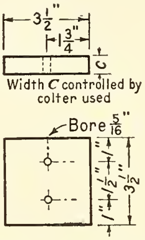


Figure 13.—Block (make four alike).

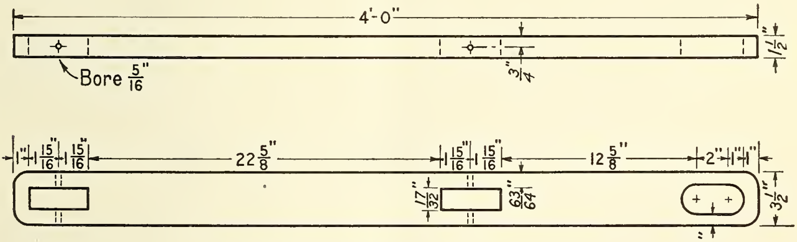


Figure 14.—Bar (make one).

Knife arms should be made next, as shown in figure 15. Rights and lefts differ in that the square holes are countersunk on opposite sides. The knife shown in figure 16 is a 40-inch lister corn-cultivator knife, with serrations ground from the under side, as indicated. Such knives can be obtained from implement dealers. The slotted hole at the front end is very desirable for adjusting the height of cut. The plow bolts with square necks should be used in bolting the knives to the knife arm. Use a flat washer on the bolts which go through the slotted hole in the knives. The knife arms are now ready to be placed on the knife bolts. The nuts on these bolts should be drawn down snugly, but not tightly enough to bind the knife arm and prevent it from turning around the bolt. A $\frac{5}{32}$-inch drill should be run through the nuts and bolts and a ⅛-inch cotter pin inserted to keep the nuts from working loose.

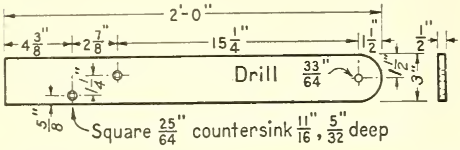


FIGURE 15.—Knife arm (make one right and one left; left shown).

OPERATION OF THE SLED CORN CUTTER

When the corn is being cut with a sled corn cutter, the horse walks between the rows. Men who handle the fodder stand on the sled behind the knives with their backs toward each other and the standards between them. The bundle of fodder is caught on the arm nearest the row, the other hand being used to catch stalks that are leaning or broken over and place them with the other fodder, or to aid in holding the bundle. Eight to ten hills are usually about all an operator can easily hold, depending on the size and weight of the corn. The horse is stopped after the desired number of hills have been cut, the loads of fodder are placed in a shock, and the operation is repeated. If the corn is down badly it is well to have a corn knife on the machine to cut loose an occasional stalk which may not be entirely severed from the ground. This cutter, with the knives at the ground surface, will be found to do decidedly better work in down corn than cutters which have knives set several inches above the ground level.

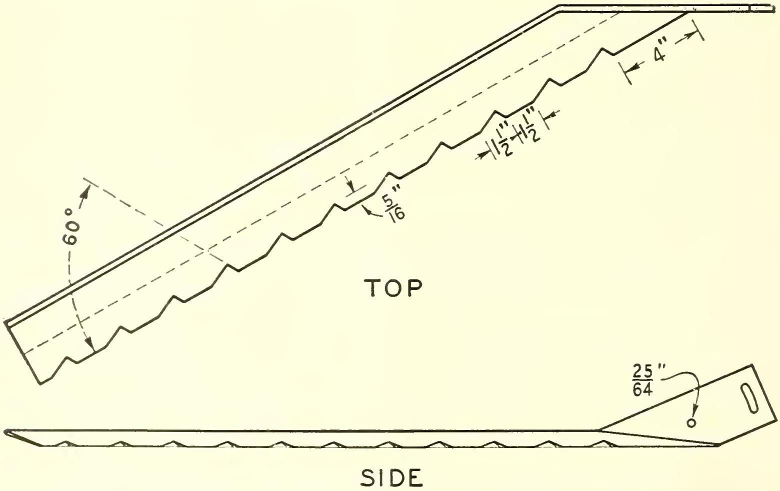


FIGURE 16.—Knife (make one right and one left; right shown).

The use of the cutter may be difficult when first attempted if the horse pulling the cutter is not accustomed to the work. The horse should be trained to start and stop promptly. A well-trained animal will require little attention from the operators. It is almost imperative that the horse be provided with a muzzle to prevent it from feeding on the corn. The cutter had best be pulled past the shock before stopping, so the men can step off the rear of the sled with their bundles of corn. If the operators step in front of the knives there is danger of cutting their feet or legs if the horse moves forward unexpectedly.

In ridged corn it may be necessary to tip the knives down considerably at the outer end, so that they will not cut below the ground surface but will slide directly on the surface and cut the stalks at that point. If the knives are kept sharp, stalks will seldom be pulled out by the roots. Cutting pairs of rows that were dropped simultaneously by the planter is desirable. If ridges thrown up during cultivation are troublesome, checked corn can be cut by crossing the field at right angles to the direction in which the last cultivation was made. Offsetting the attachment of the singletree to the hitch can also be used to compensate effects produced by ridges or ditches. If the sled sways considerably between rows, try setting the colter axle in a lower hole, so that it will penetrate deeper into the ground.

Two men, with a well-trained horse, should cut and shock at least 4 to 5 acres of corn a day.

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